KUNGL. SVENSKA VETENSKAPSAKADEMIENS HANDLINGAR. Band 52. N:o 4.

RESULTS

OF

DR. E. MJÖBERGS

SWEDISH SCIENTIFIC EXPEDITIONS

TO

AUSTRALIA 1910—1913

IV.

BATRACHIANS

BY

LARS GABRIEL ANDERSSON

WITH ONE PLATE

READ JANUARY 22ND 1913

UPPSALA & STOCKHOLM
ALMQVIST & WIKSELLS BOKTRYCKERI-A.-B.
1913

A review of the frogs, described from the Australian continent.

The first Australian frog which is scientifically described seems to be the *Common Blue Frog, Hyla cærulea*, diagnosed and figured by J. White in *Journ. N. S. Wales* 1790. A few years later G. Shaw in the *Naturalist's Miscellany* vol. 6, tab. 200 describes and figures another species which he calls *Rana Australica*. Both these species are mentioned in J. G. Schneider's *Historiæ Amphibiarum*, Jena 1799—1801, *Rana australica*, however, named *R. spinipes*, and said to be »ex insulis oceani Austrasiam cingentis». In Vol. III, Part I, *Amphibia*, of his great work, *General Zoology*, London 1802, G. Shaw accepts Schneider's name for his *R. australica*, but he says that its habitat is really New Holland, from which country he had obtained a drawing of it, the type of his diagnose and figure. He has evidentely not seen the animal itself. His description, however, does not correspond with any Australian frog, »Pedes anteriores supra aculeati etc», — I have not had the opportunity of seeing his figure — and possibly Schneider is right about its habitat. Possibly it is a species of *Bufo*, perhaps *B. melanostictus*. Being so very doubtful, the *Rana Australica* Shaw or *R. spinipes* Schneid. disappears very soon from the literature, and I have only seen it mentioned in the works, quoted above. In Daudin's *Histoire naturelle des Reptiles*, Paris 1803, as well as in Cuvier's *Regne Animale*, and in Merrem's *Versuch eines Systems der Amphibien*, Marburg 1820, but a single Australian species is recorded, viz. White's *Rana* (*Hyla*) *cærulea* from N. S. Wales, and as late as 1820 this species alone represents the batrachian fauna of Australia.

The year mentioned, however, Lesson in *Duperrey, Voy. Coquille* Zool. II, describes two new species from the Australian continent, viz. *Hyla aurea*, very common in most coastal regions, and *Rana papua*, the single representative of the family *Ranidæ* in Australia, and now the batrachian world even of this continent begins to be brought into light. Still it goes rather slowly; in the year 1835 J. E. Gray describes in Proc. Zool. Soc. p. 57 *Bombinator* (*Pseudophryne*) *australis*, founded on a specimen according his statement from Swan River, and 1839 Tschudi adds four new species, described in his *Classification der Batrachier*, published in Mem. Société Sc. Nat., Neuchatel, for this year, viz. *Crinia georgiana* from King George's Sound, South West Australia, *Dendrohyas* (*Hyla*) *peronii* from »New Holland», and *Dendrohyas* (*Hyla*) *citropa* and *Litoria* (*Hyla*) *freyceneti* from Port Jackson, Sydney.

By this eight Australian species were known, which number is considerably increased already two years afterwards (1841) by the publication of two important works: the part VIII of DUMÉRIL and BIBRON's great *Erpetologie général*, Paris 1841, and the account of Captain GEORGE GREY's journey in North-West and Western Australia, *Journals of Two Expeditions of Discovery in North-West and Western Australia during the years 1837, 38 and 39*, London 1841. In the first mentioned work DUMÉRIL and BIBRON describe as new *Cystignathus* (*Limnodynastes*) *peronii* from New Holland?, *Hyla jervisiensis* from la baie de Jervis, *Hyla lesueurii* from Port Jackson, *Hyla ewingii* from Van Diemen's Land and *Phryniscus australis* (*Pseudophryne bibronii*) from New Holland. In an appendix to the other work quoted J. E. GRAY describes *Cystignathus* (*Limnodynastes*) *dorsalis*, *Helioporus albopunctatus*, *Hyla adelaidensis*, *Hyla binoculata*, *Uperoleia marmorata*, and *Breviceps* (*Myobatrachus*) *gouldii*, the two *Hyla* species being, however, synonymous with each other. All these GRAY's species are from West Australia but without any exact statement of the localities. The districts explored by GREY's expedition were, however, the surroundings of the small Glenelg River, opening into the Doubtful Bay, N. W. Australia, as well as the coast from Perth to Shark's Bay, thus the same part of the continent visited by Dr. MJÖBERG's expedition, although the latter also penetrated into the interior of the country.

The following year (1842) J. E. GRAY published in the *Zoological Miscellany* some notes on a small collection of batrachians from Port Essington on the North coast of Australia, received to the British Museum from Mr. GILBERT, and containing the following new species: *Discoglossus* (*Limnodynastes*) *ornatus*, *Alytes* (*Chiroleptes*) *australis*, *Pelodytes* (*Hyla*) *nasuta*, *Pelodytes* (*Hyla*) *affinis*, *Hyla rubella* and *Eucnemis* (*Hylella*) *bicolor*.

In the years 1840—1841 E. J. EYRE explored the regions of the Murray River, penetrating also into the interior of Central Australia as far as to 29° S. Lat., and continued his journey along the whole South coast to King George's Sound. E. J. GRAY revised the herpetological collections of this expedition as well which, however, were rather poor with regard to batrachians. In the account of the journey: *Journals of Expeditions into Central Australia and overland from Adelaide to King George's Sound*, London 1845, he described as new only a single species, *Perialia eyrii*, from the Murray River, which, however, according to GÜNTHER's statement in the Catalogue of Batr. Sal. in the British Museum 1858, is only a young *Heleioporus albopunctatus*, already described from GREY's journey. In this work, however, GRAY gives good figures not only of the species mentioned, but also of some others, described, but not figured before, viz. *Phryniscus* (*Pseudophryne*) *australis*, *Discoglossus* (*Limnodynastes*) *ornatus*, and *Cystignathus* (*Limnodynastes*) *dorsalis*. By these figures EYRE's »*Journals*» are also to be reckoned among such older works which are valuable for the knowledge of the Australian batrachians, although there are no exactly new diagnoses to be found in the same.

By this now 24 species were described from different coast districts of the Australian continent, but thence follows a long stagnation. During the whole period from 1842 to 1858, when GÜNTHER's *Catalogue of the Batrachia Salientia in the Col-*

lection of the British Museum was published, only two good new species became known, viz. *Litoria (Hyla) punctata*, described by A. DUMERIL in Ann. Sc. Nat. 1853 (recorded in BOULENGER's Catalogue under the name of *H. dimolops* COPE, the name *H. punctata* being preoccupied), and beside this *Crinia signifera*, briefly described by GIRARD in Proc. Ac. Nat. Sc. Philadelphia 1853. This latter species was obtained by a U. S. Exploring Expedition, under the command of CH. WILKES, which also visited the south-eastern parts of Australia, where it collected beside the species mentioned specimens of *Limnodynastes peronii* and of *Bufonella crucifera*, a new genus and new species, established by GIRARD, but afterwards not with certainty identified with any species known. KEFERSTEIN (p. 272) thinks that it possibly may be a *Pseudophryne bibronii* which seems to me to be rather probable, although the yellowish head speaks of a close relationship to *Pseudophryne australis* as well. According to my opinion, however, these forms are not specifically distinct. Two other species, also described by A. DUMERIL (1853, 1854) under the names *Litoria marmorata* and *Litoria verreauxii*, have not been identified afterwards, and are not recorded in the Catalogue of the British Museum 1882.

In the year 1858 A. GÜNTHER published his excellent work, the *Catalogue of the Batrachia Salientia in the Collections of the British Museum*. In this 26 Australian species are recorded, one of which was described as new, viz. *Limnodynastes tasmaniensis* from Tasmania and New Holland. Among these 28 species described before that time (DUMÉRIL's *Litoria marmorata* and *L. verreauxii* also reckoned among them) he does not record *Rana papua*, *Crinia signifera* and *Hyla lesueurii*, beside which *Hyla affinis* GRAY is considered as synonymous with *H. freyceneti* TSCHUDI. On the other hand, *Myobatrachus gouldii* GRAY is recorded both under this name and under the name of *Chelydobatrachus paradoxus* SCHLEGEL.

Of course the British Museum in the first rank received material from Australia, and in the years following after the publication of his Catalogue GÜNTHER described several new Australian frogs. In three »*Contributions to our knowledge of Batrachians from Australia*» in Ann. Mag. Nat. Hist. 1863, and in Proc. Zool. Soc. 1863, 1864 the following are described: firstly *Limnodynastes krefftii* and *Hyla krefftii* from Sydney, *Limnodynastes affinis*, *Cryptotis brevis*, and *Platyplectrum marmoratum* from Clarence River, the last mentioned afterwards proved to be identical with *Limnodynastes ornatus*, already known before that. In the second »contribution», *Observations on Australian Tree-frogs living in the Society's Menagerie*, *Hyla phyllochroa* from N. S. Wales is described as new, beside which the author gives an account of the life in captivity of *Hyla cærulea*, *H. peronii*, and *H. krefftii*, all received from N. S. Wales. In the third »contribution» we find diagnoses of *Mixophyes fasciolatus* from Clarence River, *Pterophrynus affinis* from West Australia (by BOULENGER considered as a variety of *Crinia georgiana*), *Pterophrynus (Crinia) tasmaniensis*, and *Pterophrynus (Crinia) lævis* both from Van Diemen's Land, and *Litoria (Hyla) wilcoxii* from Clarence River (in BOULENGER's catalogue stated to be synonymous with *H. lesueurii* DUM. & BIBR.)

Although it does not contain any description of new species, a paper by G. KREFFT, *On the Batrachians occurring in the neighbourhood of Sydney with remarks upon their geographical distribution,* Proc. Zool. Soc. 1863, is worthy of mentioning here, as it gives an account of the geographical distribution of the East-Australian frogs, known at this time. In this paper KREFFT enumerates 17 species as occuring in the neighbourhood of Sydney, and gives short notes on their distribution and biology.

At the same time also Prof. W. PETERS in Berlin is very actively writing upon Australian batrachians. In Mon. Ber. Berlin Ac. this excellent herpetologist describes 1863 a collection of batrachians from Adelaide which, however, contains only one new species, *Neobatrachus* (*Heleioporus*) *pictus.* Beside this, he records from the same locality *Limnodynastes tasmaniensis, L. dorsalis* (described as new under name of *Platyplectron dumerilii*), *Crinia signifera* (also described as new, and called *Camerolius varius*), and *Hyla adelaidensis.* Some years afterwards the same author describes in Mon. Ber. Berlin Ac. 1867 *Chiroleptes inermis* from Rockhampton, Queensland, and beside this from the same locality a species which he calls *Phractops alutaceus,* in BOULENGER'S Catalogue considered as synonymous with *Chiroleptes australis.*

In Ann. Mag. Nat. Hist. of the same year (1867) GÜNTHER gives an account of the collections of Australian batrachians received to the British Museum during the time which has elapsed after his last publication mentioned above. Among these he records as new *Limnodynastes platycephalus* from Adelaide, *Chiroleptes alboguttatus* from Port Denison (Cape York), *Litoria* (*Hyla*) *latopalmata* from Port Denison, *Hyla infrafrenata* and *H. nigrofrenata* both from Cape York. Besides he gives in this paper many new localities for species described before.

A third important work from this year is the zoological part of »*Reise der Österreichischen Fregatte Novara um die Erde, 1857—1859.* Erster Band, Wien 1867», written by Prof. FR. STEINDACHNER. In Australia the expedition only visited Sydney, but there and from its neighbourhoods STEINDACHNER obtained a rich collection of batrachians. He names several species as new, most of these, however, later stated as identical with forms already described, viz. *Opistodon frauenfeldti* (= *Limnodynastes ornatus*), *Cyclorana Novæ Hollandiæ* (= *Chiroleptes australis*), *Pterophrynus fasciatus* (= *Crinia signifera*), *Heliorana grayi* (= *Limnodynastes dorsalis*), and *Litoria copei* which, also according to statement by BOULENGER, possibly may be synonymous with *Hyla lesueurii* DUM. & BIBR. Only one of STEINDACHNER'S new species *Limnodynastes salminii,* »aus Australia», has been maintained as a good species. In addition to the species, mentioned, he records from N. S. Wales *Mixophyes fasciolatus, Limnodynastes tasmaniensis* and *krefftii, Cryptotis brevis, Pterophrynus varius, Uperoleia marmorata, Pseudophryne bibronii, Litoria freyceneti* and *nasuta, Hyla peronii, lesueurii, aurea, phyllochroa, and ewingii,* and *Calamites cyaneus.*

In the following year (1868) the first, and really, even to the present day the only monographical work on the batrachians of Australia, »Über die Batrachier Australiens», was published by W. KEFERSTEIN in Archiv f. Naturgeschichte 1868

Bd 34.[1] In this paper 48 species are recorded, 29 of these more or less minutely described from specimens, examined by the author. Beside *Heliorana superciliaris*, already before described by himself (Götting. Nachrichten 1867) under the name of *Platyplectrum superciliare* (according to BOULENGER's catalogue identical with *Limnodynastes dorsalis*), he states as new *Pseudophryne coriacea* from Clarence River, *Hyla schuttei* (= *H. adelaidensis*) and *Hyla dentata* both from Sydney, and finally the mysterious *Pachybatrachus petersii*, the habitat of which also is stated to be Sydney, but which according to BOULENGER possibly is synonymous with the Indian *Cacopus systoma* SCHNEID. *Hyla gracilenta* from Port Mackay N. E. Australia was described 1869 by PETERS (Mon. Ber. Berl. Ac.), which author two years later also reported *Chiroleptes brevipes* from »Port Bowen, Australia» (loc. cit. 1871). Soon afterwards GÜNTHER distinguishes *Notaden benetti* and *Chiroleptes platycephalus* (Ann. Nat. Hist. 1873) both from N. S. Wales, PETERS (Mon. Berl. Ac. 1874) added *Hyla parvidens* from Port Philipp, Victoria, and *Hyla calliscelis* from Adelaide. *Chiroleptes brevipalmatus* (N. E. Australia) was distinguished by GÜNTHER in Journ. Mus. Godeffr. 1876. By this all species which are recorded in BOULENGER's Catalogue of 1882 as known before that time are described. In this standard work BOULENGER gives descriptions of 50 Australian frogs, and among them one species, *Pseudophryne guentheri* from W. Australia, is recorded as new.

Two years after the publication of this catalogue, DE VIS describes as new no less than seven batrachians from Queensland (Proc. Linn. Soc. N. S. Wales 1884, and Proc. Roy. Soc. Queensland 1884—1885), but, according to BOULENGER, only one of these can be considered as a good species, viz. *Limnodynastes olivaceus*.

Year after year the following new species are described:

Limnodynastes fletcheri and *Crinia victoriana* BOULENGER in Ann. Nat. Hist. (6) 2, p. 142, 1888, the former from N. S. Wales, the latter from Victoria.

Phanerotis fletcheri new genus, near *Cryptotis*, and new species, described by GÜNTHER 1890 from N. S. Wales (Proc. Linn. Soc. N. S. W. (2), 5 p. 593).

Crinia frogatti FLETCHER, P. Linn. Soc. N. S. Wales (2) 6, p. 275, 1891 from Victoria.

Pseudophryne dendyi and *P. semimarmorata* LUCAS from Victoria in Proc. R. Soc. Vict. (2) 4, 1891.

Hyla chloris BOULENGER, N. S. Wales. Proc. Linn. Soc. N. S. Wales (2) 7, 1892, p. 403.

Philocryphus flavoguttatus n. g. n. sp. from the neighbourhood of Sydney, described by FLETCHER in Proc. Linn. Soc. N. S. Wales (2) 8 p. 233, 1893; allied to *Heleioporus* as well as to *Chiroleptes*.

Crinia haswellii FLETCHER, N. S. Wales. Pr. Linn. Soc. N. S. Wales (2) 8 p. 522, 1893.

[1] Two papers by G. KREFFT: *On the vertebrated Animals of the lower Murray* and *Darling, their habits, economy and geographical distributions* in Trans. Phil. Soc. N. S. Wales 1862, and *The Frogs of Australia* in Monthly Notices of Papers and Proc. Roy. Soc. Tasmania 1865 have not been accessible to me. According to KEFERSTEIN we may find in them: »einige Mitheilungen über die geographische Verbreitung, die Lebensweise und das Vorkommen der australischen Frösche».

Chiroleptes dahlii BOULENGER from Daly River, N. Australia in Proc. Z. S. 1895 p. 867.

Hyla gilleni SPENCER from Alice Springs in Central Australia, in Report Horn Scient. Exped. Cent. Austr. Part II, Zool. 1896, p. 173.

Philoria frosti FLETCHER new genus and new species, allied to *Limnodynastes*, from Victoria. Proc. R. Soc. Victoria (2) 13, p. 176, 1901.

Hyla maculata SPENCER from Victoria, Proc. R. Soc. Victoria (2) 13, p. 177, 1901.

Hyla luteiventris OGILBY from Brisbane in Proc. R. Soc. Queensland 20, p. 31, 1907.

As may appear from this short review, New South Wales and Victoria are the habitat of most of the species described during the last 30 years. In these colonies the fauna of batrachians has been very actively investigated chiefly by Mr. J. J. FLETCHER which author has published a series of papers (the most important of them in Proc. Linn. Soc. N. S. Wales 1889—1893) regarding the batrachians of N. S. Wales, their geographical distribution and their life history. At the same time A. H. S. LUCAS gives two short papers on species from Victoria (Proc. Royal Soc. Victoria Tom 4 and 9), and lately T. M. S. ENGLISH has given an account of batrachians living in Tasmania (Proc. Zool. Soc. London 1910). Regarding the fauna of batrachians of the remainder of the Continent, however, I have not been able to find more than the following two papers published in later years: *Report on the work of the Horn Scientific Expedition to Central Australia*, Part II, Melbourne 1896, and *Semon's Zoologische Forschungsreise in Australien und dem Malayischen Archipel 1891—1893*, Jena 1894. In the former B. SPENCER carefully describes and figures the few batrachians which were found in Central Australia, viz. *Limnodynastes ornatus*, *Chiroleptes platycephalus*, *Chiroleptes brevipalmatus*, *Heleioporus pictus*, *Hyla rubella*, and *Hyla gilleni*, the last being new. In the latter of the publications mentioned O. BOETTGER gives short notes on *Limnodynastes salmini*, L. *ornatus*, *Hyperolia marmorata*, *Chiroleptes australis*, *Pseudophryne bibronii*, *Hyla cærulea*, *H. peronii*, *H. rubella*, *H. lesueurii* and *Hylella bicolor*, collected at Burnett River District, Queensland.

On the batrachians of West Australia, however, nothing has been published; especially its interior parts have been a real terra incognita regarding these animals.

As this expedition during several month has explored the interior of the Kimberley district, viz. regions at the Fitzroy River and on St. George Range with the headquarter at Noonkambah about 160 miles from the coast, the determination of the batrachians collected there has been of a great interest. The collections now examined may thus, at least to some extent, fill up the gaps in our knowledge of the West Australian fauna of batrachians. Of the 17 species obtained 12 are from West Australia, and of these not less than 10 from the interior of the Kimberley district. One of the latter I have described as new, *Pseudophryne mjöbergii*, and five are new to West Australia, viz. *Limnodynastes ornatus* GRAY, *Chiroleptes inermis* PETERS, *Heleioporus pictus* PETERS, *Notaden benetti* GNTHR., and *Hyla affinis* GRAY. Beside these the following

species were found in the interior districts: *Crinia signifera* GIR., *Chiroleptes australis* GRAY, *Hyla peronii* TSCHUDI, and *Hyla rubella* GRAY. Of the six species reported from Central Australia by the Horn-expedition, three, or half the number, have been found in the interior of North West Australia as well.

The table below gives an accouut of the geographical distribution of batrachians hitherto found in West Australia, based partly on notes i the literature, and partly on the collections here described.

	W. Australia				Centr. Austr.	N. Coast of South Austr.	S. Coast of South Austr.	Queensland.	N. S. Wales.	Victoria.	Tasmania
	Southern Coast	West Coast	N. W. Coast	Interior of Kimberley.							
Limnodynastes dorsalis . .		+	+			+	+	+	+	+	+
» ornatus . .			+	+	+	+		+	+		
Crinia georgiana	+					+			+		
» signifera		+		+			+	+	+	+	+
Uperoleia marmorata . . .		+						+	+		
Chiroleptes australis . . .			+	+		+		+	+		
» inermis				+				+			
Heleioporus albopunctatus .		+	+			+			+		
» pictus				+	+		+		+	+	
Pseudophryne guentheri . .		+	+								
» mjöbergi . .				+							
Notaden benetti				+				+	+		
Myobatrachus gouldii . . .		+	+								
Hyla cærulea			+			+		+	+		
» rubella			+	+	+	+		+	+		
» peronii			+	+		+		+	+	+	+
» latopalmata								+			
» ewingii	+						+	+	+	+	+
» adelaidensis	+	+				+	+	+	(+)		
» affinis			+	+		+		+			
» aurea	+	+				+			+	+	+

Limnodynastes peronii DUM. & BIBR. — 2 specimens from Blackal Range, S. E. Queensland, in the rain forest about 20 miles from Brisbane, $^{19}/_{9}$ 1911; a small male, 26 mm. from snout to vent, a larger female, 44 mm. E. Mjöberg.

To judge from the localities, hitherto known, this species seems to have a rather limited distribution over the coastal regions of the South-eastern Australia. The centre for its habitat appears to be New South Wales where it has been found

at many places, a single time even west of the Dividing Range, but only »as a straggler from the coast» (FLETCHER 1890). From New South Wales the species is distributed southwards to Victoria where LUCAS records it from several places, and to Van Diemens Land where it is found according to statements in the British Museum's Catalogues, though not refound later by Mr ENGLISH. Towards the north it reaches to the southern parts of Queensland where it has been found by this expedition as well as by KREFFT (Cat. Batr. Sal. 1882) and FLETCHER (1892).

The colour of the upper surfaces of the two specimens in this collection, a large female and a small male, agree completely, as both are provided with beautiful and regular dark markings, viz. a broad median dorsal stripe, beginning between the eyes and divided by a narrow light vertebral line, running from snout to vent, a »dark stripe from the tip of the snout along the canthus rostralis, through the eye to the shoulder», another dark brown band on the flanks from behind the eye to the groin, and below this several dark spots. All the dark markings are very distinct, and generally margined with a narrow white line. In the small specimen the under surfaces of the limbs, especially those of the thighs, have a pretty yellowish red tint.

The difference in length of the hind limbs which has been stated betwen this species and the nearly allied *L. tasmaniensis* GNTHR. is shown by the following measurements (in percentages of the length of the body).

	Length of femur	Length of tibia	Length of tarsus with 4th toe	Length of whole hind limb.
L. peronii ♀ 44 mm. . . .	46,3	50,5	78,0	174,8
L. tasmaniensis ♀ 41 mm.	53,3	55,2	83,9	192,4

Limnodynastes dorsalis GRAY. — A male specimen, Perth, West Australia, August 1911, 47 mm. in length, without any rugosities on the digits.

5 larvæ, four of these nearly fully developed, Perth, Sept. 1910.

This species is recorded from the coasts of all the colonies of the Australian continent, and from Tasmania, and it is also known to occur in the inland division of New South Wales (FLETCHER). The HORN-expedition did not, however, find it in Central-Australia, nor has it been found by Dr. MJÖBERG's expedition in the interior of the Kimberley-district, and evidently the coastal regions are the main habitat of this species.

Limnodynastes ornatus GRAY. — 2 specimens from Fitzroy-River in the interior of the Kimberley Division, N. W. Australia, Marz 1911, buried in the sand; 32 and 38 mm.

1 specimen, St. George Range, Kimberley Division, 170 miles from the coast, in a spring, February 1911; 34 mm.

1 specimen, Streets Station near Broome, Dampier Land, August 1911. 26 mm. E. Mjöberg.

All specimens seem to be males.

This species appears to be much more rare in East-Australia than the preceeding. It is, however, recorded from Queensland, and from New South Wales, in the latter colony found in the interior as well as in the coastal regions (FLETCHER). It is not known from Victoria, nor from Tasmania, nor from the whole of the southern and western coasts. On the northern coast it is recorded both from Queensland and South Australia (GRAY, BOULENGER in Cat. Batr.), and in the inner districts of this latter colony it is found by the Horn-expedion »from south of Charlotte Waters all up the Finke basin to the Alice Springs and to the west in the James Range». Its occurrence in the inland of North-West Australia, where it appears to be common, as these specimens prove, corresponds fully with records just quoted. This species is evidently a more pronounced inland-form than the preceding, the occurrence of which seems to be chiefly bound to the coast. It is, as pointed out by FLETCHER and SPENCER, a very good burrower which makes it able to endure the climate of Central-Australia, otherwise so very unsuitable for the batrachians.

The colour, which in all the specimens is chiefly alike, agrees completely with the pattern stated by SPENCER (the Horn-expedition) as typical for the Central-Australian specimens, shown in his figures 3 and 4, plate 13, and it is principally the same in GÜNTHER'S specimen from Clarence River as well (1863). In all the specimens the toes are webbed at the base only, the web reaching as distinct folds along the toes to the tips. Such a strong developement of the web as SPENCER states to be typical for somewhat larger specimens from Central-Australia is not at all to be seen in the present specimens.

Cryptotis brevis GNTHR. — 2 specimens, Yandina at the foot of Blackal Range, S. E. Queensland, in the rain-forest, about 20 miles from Brisbane, $^{15}/_{9}$ 1911; males, 39 and 29 mm.

2 specimens from Blackal Range, in the tropical rain-forest. S. E. Queensland, $^{19}/_{9}$ 1911; females, 32 and 28 mm. E. Mjöberg.

This species seems to have a rather limited distribution; as far as I have been able to find out, it is known only from the coast of New South Wales with its centre at the lower Clarence River, and from the southernmost Queensland, where it was collected by Dr. MJÖBERG as well.

The singular tooth-like processes in front of the lower jaw are in the larger male exceedingly long, 2,5 mm., in the smaller, however, considerably shorter.

Crinia signifera GIR. — Figs. 1 a—l. 57 specimens from several places.
33 specimens from Perth, Sept. 1910.
3 » from pools in the Fitzroy-River, Kimberley Division, N. W. Australia, $^{4}/_{11}$ 1910.
14 » in different springs in St. George Range, Kimberley, about 170 miles from the coast; February 1911.
2 » Mundaring near Perth, $^{22}/_{8}$ 1911.
1 » Yandina, S. E. Queensland, at the foot of Blackal Range, about 20 miles from Brisbane in the rain-forest; $^{15}/_{9}$ 1911.
4 » Adelaide, $^{11}/_{10}$ 1911.

According to FLETCHER this species is common in the whole of New South Wales, LUCAS mentions several localities for its occurrence in Victoria, and ENGLISH states it to be very common in Tasmania. Also from West Australia it is mentioned before, and this expedition found it to be common at Perth as well as in the interior of the Kimberley Division. During the short stay in South Eastern Queensland and in Adelaide it was also caught. Evidently it is one of the most common of the Australian frogs. From the North coast, however, I have not seen it recorded, nor has it been found by the HORN-expedition in the central regions of Australia.

Being so common, this species is at the same time so very variable, especially with regard to the colour, a fact very conspicuous in the above mentioned collection from Perth, where once in one and the same pool a great number of different colour variations were found (figs. 1 a—h). As the authors generally only state the great variation of this species, without going further into details, it seems to me that a further account of this matter will be of a certain value.

As all kinds of colour variations were met with at the same time and at the same place, it is evident that the variation does not depend on locality nor on season nor is it, except to some extent, due to age and sex. All the colourpatterns in fig. 1 are to be found in males as well as in females, in rather small specimens as well as in large ones. As a rule, however, the males are darker than the females,[1] as ENGLISH also says (Proc. Zool. Soc. 1910 p. 630), and the quite small specimens are uniform black. Most of the specimens from different localities are, as briefly pointed out in BOULENGER'S catalogue, »olive above, marbled or longitudinally striped with darker», but as a rule it may be said that the larger the specimens are, the smaller and more indistinct become the otherwise so regular dark markings. In some of the largest specimens — among these the largest I ever had (23 mm.) — the upper surface was almost uniform, brown in the male, olive grey in the female.

The change of the dark juvenile colour to the lighter fullgrown one appears to take place in different specimens at very different time; thus some loose already quite early almost all their larval garb, while some keep nearly all of it a long time. These changes also take place in a rather different way in different specimens, the whole process causing a very great and at the first glance almost quite irregular

[1] The sex has been stated by examining the presence or absence of the slitlike openings which in the males on each side of the tongue lead into the vocal sac.

variation in colour. A closer study of the specimens shows, however, that a certain regularity is to be found, and the figures explain in what manner the change of the colour appears to be effected.

Only one of the smallest of the completely developed specimens (8 mm. between snout and vent), and possibly some of the somewhat larger ones may be said to be uniform black above — the under surfaces and the limbs being already rather light. In all the other dark coloured specimens there is at least an indication of the colourpattern which is shown in fig. *a*, and evidently produced in such a way that the sides of the back and the upper side of the nose have begin to fade, by which a broad dark dorsal band arises, extending from the vent to between the eyes, separated from the still dark coloured sides by a narrower and lighter dorso-lateral stripe. In some specimens the light markings are scarcely discernible, while in others it is quite distinct, and in some the contrast between the light stripes and the dark bottom colour is sharply marked. Sometimes the latero-dorsal stripes have a tinge of red, and in one specimen from Southern Queensland they were, according to Dr. MJÖBERG's notes, bright salmon-red.

The next change of colour seems to be that a pair of deep and backwards directed notches cut off the anterior part of the dorsal band as a more or less triangular spot between the eyes (fig. *b*); we find this spot in most of the specimens, and it is also mentioned in the short description of the colour by BOULENGER (l. c.). A process corresponding to this is sometimes to be found on the sacral region as well (fig. *c*). Later on, the remaining part of the dorsal band becomes divided, as the figures *c* and *d* show, by a light median stripe in two straight parallel narrower bands, or it will be cut into by pairs of lateral notches (fig. *e*), which gradually become confluent in the middle, thus as a rule, forming two or three curved crossbands on the posterior part of the back (fig. *f*). The foremost of these notches usually do not reach each other, thus forming, as is shown in fig. f, a large hourglass-shaped spot on the anterior back. Often this spot is mesially divided by a narrow light line in two longitudinal, curved markings (fig. *g*).

On such a way has arisen the following colour pattern, rather common in large specimens: the back light or dark olive brownish grey with a dark triangular spot between the eyes, behind this two narrow longitudinal curved spots more or less separated mesially, and at last on the posterior part of the back two (or three) curved crossbands. If a light narrow median line has arisen at the same time as the lateral notches, as shown in fig. *e*, the transverse bands on the posterior part of the back are divided into pairs of spots, an indication of which is seen in fig. *g*. In some specimens the dark markings are bordered with white, to some extent marked by figs *c*, *e* and *g*. In some at last the dark markings are very indistinct. This can, however, only in a slight degree be said about the specimens of this collection on which I have chiefly based my description of the colour variations, viz. the collection from Perth. Even in these last specimens, however, the bands and spots have a tendency to disappear, as is proved by fig. *h* which shows one of the largest specimens (a female) of this collection. The two emarginated dark dorsal bands, rem-

nants of which still are to be seen in this specimen (a type intermediate between figs *d* and *e*), are just fading into the light ground colour.

In one of the specimens from Adelaide (fig. *i*), a rather large male, the back is uniform olive grey, but still rather well defined from the darker sides. A closer examination reveals, however, that there are indications of the same pattern as in the specimens from Perth, and in another large specimen from Adelaide we find the same markings as in fig. *d*. Thus, there is no doubt that a colour pattern somewhat like this has existed before in the now almost uniform specimens as well, although the dark colour has disappeared with increasing age.

The largest specimens of this species I have seen, are three specimens from Moss Vale, New South Wales, presented to the Expedition by Mr. T. Steel. The largest of these (23 mm.) has the back uniform brownish gray without distinct limits against the somewhat darker sides, while the two other, only slightly smaller, specimens still have rather distinct dark markings. In a fourth specimen of smaller size from the same collection (15 mm. between nose and vent) we find an aberrant pattern, as shown in fig. *k*. The markings on the anterior back agree somewhat with those in fig. *f*, although the anterior branches of the x-shaped spot have mostly disappeared, but on the posterior part of the back the usual median band is very irregularly toothed. Another different pattern is found in a small female (12 mm.) from Perth, fig. l. The whole back is dark brown with a narrow white vertebral stripe, but distinctly lighter than the dark sides. It looks as if in this specimen the whole back should fade at the same time without any remaining dark spots.

Almost as great variations as those of the upper side are exhibited by the lower side. In the darkest specimens it is more or less black; the under side of the legs is, however, always lighter, and usually a light median stripe extends over the dark ground of the chin, throat, and anterior breast. In somewhat lighter specimens we find small light dots as well, scattered over the dark ground colour. These spots increase in size more and more with age, so that the under surface, especially of the females, may become pure white with dark irregular spots. Sometimes this very beautiful pattern is to be found in the males as well, but as a rule these are more or less dark below, especially on the throat.

Two specimens captured in copula at Perth, at the same time as the others from this locality, Sept. 1910, are remarkably small, the male 13,5 mm., the female 16,5 mm.; evidently this species very soon becomes mature. Both have the back coloured as in fig. *a*, but at least in the larger female the anterior triangular spot is distinct; the lower parts of the male are uniform greyish brown with the chin somewhat darker, and with a narrow light median stripe. The female is white underneath with illdefined dark markings.

Also in other respects than with regard to the colour this species varies considerably, and the name *varia*, used for it by several authors, appears to have good reasons, although it does not have priority. According to the diagnosis in Boulenger's catalogue the upper side is warty. In some specimens it is distinctly so, but in some others it is quite smooth. Even the granulation of the under surfaces, al-

ways stated as an important characteristic of this species, is in many specimens very indistinct. It seems also, as if the folds along the toes should differ in a considerable degree, but this may perhaps be due to the different state of conservation. I think that as a rule very great discrimination must be used in establishing new species of this genus, and it will perhaps be shown that some of the many species described in later times are but forms of *Crinia signifera*. LUCAS has expressed the great variation of this genus with the following words: »I am inclined to suspect that all smooth Crinias of Victoria and Tasmania are varieties of but one species» (R. Soc. Victoria, Melbourne (2) 9 p. 42).

Chiroleptes australis GRAY. — 1 male specimen 27 mm., Mowla Downs, Kimberley Division near Gillgally (Jungarry) Creek about 70 miles south of Fitzroy River. R. Söderberg. Dec. 1910.

13 specimens. Noonkambah St. George Range in the interior of the Kimberley Division. Jan.—Febr. 1911; 8 males, 5 females; 60—83 mm. E. Mjöberg.

The type-specimen of this species was from Port Essington, and GRAY says that it »inhabits the North coast of Australia». PETERS (1867) states it from »Rockhampton in O. Australien», thus from Queensland. In the results of the Novara expedition it is described under name of *Cyclorana hollandiæ*, and is said to be from »Rockhampton nördlich von Sidney im Binnenlande». To judge from these STEINDACHNER's words, his specimens ought to be from New South Wales as his other collections from Australia. FLETCHER has not, however, found it in that colony, although he has carefully scarched for it, because both KREFFT and GÜNTHER have recorded it at least from the northern parts of that country (Clarence River). In BOULENGER's catalogue it is recorded from Port Denison and Nicol Bay. It should then belong to the eastern and nothern coasts of the continent from Clarence River to Nicol Bay in North-west. By this expedition it is now stated to live in the interior parts of north-western Australia as well, and it seems to be common there.

This species was spawning in January and February; the females captured are either filled with large eyes, or just spent. All the males, except the small specimen from Mowla Downs, have the inside of the thumb covered with blackish brown rugosities; the throat is in the males blackish brown, in the females light with small dark dots. In other characteristics the specimens agree very well with the diagnosis in BOULENGER's catalogue, except that some of them have two distinct dorso-lateral folds on each side. Another thing is that, as FLETCHER remarks (Proc. Linn. Soc. N. S. Wales 1891 p. 271), the pupil is horizontal, not vertical, which according to him it shares with the whole genus. In the small specimen the teeth are arranged in small round groups between the choanæ, not in two long oblique series directed backwards from the inner anterior edges of the choane as in the others.

Chiroleptes inermis PETERS. — Fig. 2. — 2 specimens: Hotspring, Kimberley, about 170 miles from the coast. Febr. 1911. E. Mjöberg.

I have not seen this species recorded before from any other place than PETER'S type locality, Rockhampton, Queensland.

As PETER'S diagnose is rather short, I think that a supplementary description and a figure may be of some value, especially as these specimens are very well preserved.

Tongue subcircular, slightly nicked behind; vomerine teeth, as PETERS states, in two small groups between the inner front edges of the choanæ; snout accuminate, rather prominent, $1^1/_2$ as long as the diameter of the eye; nostril equally distant from the eye and the tip of the snout; interorbital space somewhat narrower than the upper eyelid. Tympanum very distinct, $^3/_4$ the diameter of the eye. Fingers short, first longer than second (in the one specimen slightly, in the other much, longer). Toes short, $^3/_4$ webbed. The following formula shows the number of joints free from the web, counted from the first to the fifth toe: $\frac{—}{1,5}, \frac{2}{3}, \frac{3,5}{1,5}, \frac{3}{3}, \frac{1,5}{—}$. Subarticular tubercles of the fingers and toes very distinct; a small round outer matatarsal tubercle and a somewhat larger oval inner one; a white fold runs as a low but distinct ridge along the inner side of the tarsus. If the dimension of the tibia is marked off from the knee forwards along the body, it reaches the centre of the eye. Upper parts of the body chagreened and provided with scattered longitudinal tubercles; belly and under surfaces of thighs minutely granular; remaining parts of limbs as well as the chin smooth. »Greyish brown above, with irregular dark spots; lips spotted, hinder side of thighs black- and whitespotted or marbled» (Bat. Batr. Sal.). Tibia irregularly crossbanded. Under surfaces pure white, except the chin which is marbled with brown (both the specimens are males). Male with a subgular vocal sac.

Measurements:

Total length 33; 28 mm.
Lengt of snout 5,8; 5,2 mm.
» of eye 3,8; 3,7 mm.
Diameter of tympanum 2,8; 2,4 mm.
Length of femur 14; 12,5 mm.
» of tibia 15,2; 14,8 mm.
» of tarsus with 4th toe 19,5; 18,2 mm.
» of fore limb 17; 15,8 mm.

Heleioporus pictus PETERS. — 1 specimen from Mowla Downs near Gillgally Creek, about 70 miles south of Fitzroy River, in the interior of Kimberley Division, N. W. Australia. Dec. 1910. R. Söderberg.

PETER'S type specimen is from Adelaide, and the species is afterwards recorded from Victoria, from the interior of N. S. Wales, from Central Australia, and it lives

also, as shown by this specimen, in the interior of North West Australia. It is a good burrower, and thus a typical inland form able to survive the drought even in the interior of Australia. The specimen differs from the discriptions as well as from a specimen from Victoria, kept in the R. Museum of Nat. History, by the absence of the light median band and of the horny sheath on the metatarsal tubercle. The developement of the vertebral band varies usually very much in the frogs, and its absence or presence is of no importance; the absence of the horny sheath might have some more value as distinguishing characteristic, but it may, of course, happen that it may be lost and again regenerated. Thus, according to my opinon, even this difference can be considered as an individual one. SPENCER's statement in the Horn Expedition that the metatarsal tubercle is black in »typical specimens» appears also to indicate that he has found not typical specimens without any horny black sheath.

The only difference between this species and *Heleioporus albopunctatus* GRAY should then consist in the different extension of the web of the toes. As both species are typical burrowers, it is, however, possible that this difference may to be of less specific value, the web in burrowing frogs being very variable, as shown by SPENCER for *Limnodynastes ornatus* and to some extent also stated in this paper regarding *Notaden benetti*. According to KEFERSTEIN (Archiv Naturg. 1868 Bd. 34, p. 269) the toes of *H. albopunctatus* are stated to be halfwebbed or almost without any web, and according to SPENCER (loc. cit. p. 167) the toes of *H. pictus* vary from »two-thirds to fully webbed». I think, it is not improbable that the variations may be found to be still greater, and what is then the difference between these two »species»?

As SPENCER remarks, this species passes through the season of drought buried in the earth. At first, Mr. SÖDERBERG did not see a single frog at Mowla Downs, but after the pools had become filled with water after two days of rain, they swarmed with frogs, which cannot be conceived to have come from any other place than the before quite dry and hard bottom. (Under similar conditions *Chiroleptes australis* and *Notaden benetti* were caught as well.)

The specimen is a male, 44 mm. between nose and vent; the inner side of the thumb and the upper side of the 2nd finger covered with brown rugosities.

Pseudophryne bibronii GNTHR. — Figs 3 and 4. — 1 specimen, Blackal Range, Southern Queensland, in the rain-forest, $^{19}/_{9}$ 1911; 16 mm.

1 specimen, Adelaide, $^{11}/_{10}$ 1911; 30 mm. E. Mjöberg.

In his catalogue BOULENGER says that possibly *Ps. bibronii* GNTHR »may prove to be a mere variety of *Ps. australis* GRAY», and in the descriptions I have not been able to find a single characteristic by which the two forms could be sharply distinguished. I should therefore be very inclined to consider them as identical species, and use for my specimens the older name, *Ps. australis* GRAY. As, however, Mr. J. J. FLETCHER who has studied both when alive is quite sure of their specific difference, I do not dare to oppose against his opinion, especially as I have not had

specimens of both forms for comparison. I have thus not dared to follow my own opinion but have used the name *Ps. bibronii*, chiefly because the other species, *Ps. australis* GRAY, is said to be »not found outside a radius of seventy miles from Sydney» (LUCAS and le SOUËF in the Animals of Australia 1909). Considering only the characteristics which are usually employed for distinguishing species of frogs, I can namely, according to my opinion, call them *Ps. australis* quite as well as *Ps. bibronii*. The differences, stated by FLETCHER, in »temperament, in habits and in regard to the breeding season» (Linn. Soc. N. S. Wales 1889, p. 376) are unknown to me concering my specimens, thus nor giving any guidance for my determination. In this connection I cannot suppress my opinion that such differences as unlikenesses »in temperament and habits» ought to be considered more as individual variations, due to different conditions of life haunts of the specimens, than as specific characteristics. If such differences should be employed more commonly for the distinction of species, I am afraid that it would result in such a division of the species, soon leading to a complete chaos.

The small differences in colour, used by FLETCHER as an important characteristic as well, are not much more reliable than »habits and temperament». As is well known, the colour of the batrachians varies in a high degree in most species. Of *Ps. bibronii* I find then that three colour varieties are recorded in the *Animals of Australia* by LUCAS and LE SOUËF, and as far as I can see the different colour of the front is the only difference in colour, and further also the only characteristic of any importance by which *Ps. bibronii* should differ from *Ps. australis*. Besides, according to statement in BOULENGER'S catalogue, there should be in *Ps. bibronii* two large yellowish spots on the hinder side of the thighs and generally a more or less distinct pink vertebral line. In *Ps. australis* there should be only a single spot on the hind side of the thighs and a light line on the coccyx only. As proved by fig. 3 my specimen from Blackal Range agrees with *Ps. bibronii* in having the forehead of the same colour as the back, but with *Ps. australis* in the line on the coccyx and in the arrangement of the spots on the thigh. In this latter point it fully corresponds with DUMÉRIL' and BIBRON'S figure (Pl. 100, fig. 3) of their *Ps. albifrons* (= *Ps. australis* GRAY).

Not even the main characteristic, the yellow forehead, seems to be distinctive for a species (*australis*), confined to the surroundings of Sydney. In addition to the fact, namely, that GRAY'S type specimen of *Ps. australis* has been stated to be from Swan River (Proc. Z. S. 1835 p. 57),[1] also my specimen from Adelaide has, as shown by fig. 4, the forehead plainly lighter than the back. The limit between the colours is distinct, and the light area resembles rather much the figure published by DUMÉRIL and BIBRON, although the colour is light greyish, and not yellow as in that one. It is, however, not impossible that something similar has existed in this specimen as well, when alive, although the yellow colour now has faded away in the alcohol. On the remaining upper parts the specimen is nearly uniformly coloured with the

[1] According to FLETCHER is this statement probably an error (The Animals of Australia p. 284).

line on the coccyx and the usual spots on the forearm and groin vere indistinct; on the hind side of the thigh there is an irregular light stripe as stated for *Ps. bibronii*.

Thus, if these two specimens are *Ps. bibronii*, as indicated by the habitat, they appear to be intermediate forms between this and *Ps. australis* the one of them even with regard to the only real difference which is to be detected between these species, and the probability of their identity becomes still more conspicuous. If, on the other hand, the light-crowned specimen from Adelaide should be a *Ps. australis* and the specimen from Blackal Range a *Ps. bibronii*, the former species is not confined to the surroundings of Sydney, and I should have both »species» for comparison. In such a case I should be able to state that the differences between them, as far as the generally used characteristics are concerned, are too small to permit any specific distinction.

Pseudophryne mjöbergii n. sp. — Fig. 5, 6. — 2 specimens, male and female, Noonkambah, Kimberley Division, N. W. Australia, 160 miles from the coast in temporary pools. Dec. 1910. E. Mjöberg.

Snout rounded, shorter than the orbital diameter; nostril much nearer the tip of the snout than the eye, interorbital space broader than the upper eye-lid. Tongue long and narrow, entire and free behind; no vomerine teeth. Fingers quite free, short, and narrow, obtusely pointed, first shorter than second; toes short, pointed, with a small rudiment of web at the base, not fringed but with a narrow ridge along their sides. Two very large metatarsal tubercles, the larger outer compressed, and obliquely transverse, the inner one also large but rather dissimilar in the two specimens, in one (the female) it is of the same shape and direction as the outer, the two tubercles being separated only by a short interspace (fig. 6), in the other specimen (the male) it is more oval and placed along the inner margin of the foot; immediately below the heel there is a tarsal tubercle as well, small but distinct (fig. 6). If the dimension of the tibia is marked off from the knee forwards along the body it reaches just before the axilla, and the length of the whole hind limb considerably beyond the tip of the snout. Small scattered warts on the back, the belly more or less distinctly, the under surface of the thighs more coarsely granular. Behind the eye a large broad paratoid, extending to behind shoulder where it merges together with an enormous lumbar gland, which occupies the whole side from shoulder to groin, but a narrow and shallow groove separates the two swellings from each other; as a rule the hindmost part of the lumbar gland is separated from the anterior main part by a narrow groove, and by this a pair of oval glands are formed on the sides in front of the vent. There is no gland on the hind side of the thighs.

The upper parts are light olive grey with regular dark markings, viz. a stripe from nose to eye along canthus rostralis, a narrow transverse band between the eyes, interrupted in the middle, behind the eyes a large x formed marking, and behind this two or three irregular large patches on the posterior part of the back; on the

sides a few large longitudinal spots, separated from the dark markings on the back by the light upper margin of the lateral gland. Limbs crossbanded. Under surfaces uniform dirty grey.

Both specimens are of the same size; the male has an internal subgular vocal sac. In the female the eggs are well developed.

Measurements:

	♀	♂	
Total length	20	20	
Length of nose	2,2	2,2	
Diameter of abit	3	3,1	
Length of femur	6,8	7,2	mm.
» of tibia	7,1	7,1	»
» of tarsus with 4th toe	12	12,2	»
» of humerus	3,9	3,6	»
» of fore limb from elbow	7,8	8	»

By the large metatarsal tubercles the new species is allied to *P. guentheri* Blgr which also is recorded from the North-West of Australia, but it appears to be fully distinguished from that one by the tarsal tubercle, the longer hind limbs, the immense lumbar gland, the warts on the back which are of quite another shape, and by the colour.

Notaden benetti Gnth. — Fig. 7, 8. — 5 specimens, Mowla Down, Mt. Alexander near Gillgally (Jungarry) Creek, about 70 miles south of Fitzroy River, Kimberley Division, N. W. Australia. Dec. 1910. R. Söderberg. 1 male specimen, 46 mm., 4 small specimens, about 12 mm.

3 specimens, several localities on St. George Range, N. W. Australia, Kimberley Division, about 160—170 miles from the coast; Dec. 1910—Febr. 1911. E. Mjöberg. All females with large ova; one found in a spring. 47—54 mm. in length.

Günther's type specimen was obtained from the interior of New South Wales (Castlereagh River), and according to Fletcher this species is common in this colony »on the plains», but does not extend on to the coast. It is also recorded from the interior of Southern Queensland (Boulenger's catalogue), but was not collected by the Horn-expedition, and I have not found it stated from other localities than those now mentioned. As shown above, this species seems, however, to be rather common in the interior of N. W. Australia as well. Dr. Mjöberg obtained it at several places on St. George Range, and according to Mr. Söderberg it was common at Mowla Downs after rain; during the drougth it was buried in the earth (see this paper p. 17).

The strange colour of this toad, which has given it the names »*Catholic Frog*» and »*Holy Cross Frog*», is to be observed in these specimens as well, although the arrangement of the dark spots, forming the cross, is rather different from what is

to be seen in the figures, published in *Catalogue of Batr. Sal.* and in *Animals of Australia*, as well as in FLETCHER's description in *Proc. Linn. Soc. N. S. Wales*, 1891, p. 267. In the present specimens the cross is not so plainly visible as in the figures mentioned, although the dark markings are quite as distinct and quite as sharply limited from the light ground colour as in those. The dark pattern is composed of three large median spots and four lateral pairs, each spot, as FLETCHER says, formed by »very dark (black) not very much raised glandular warts or papillæ of several sizes . . . The largest warts for the most part outline the pattern, and border the insular patches». The different warts in a spot are separated by lighter colour, yet not as light as the ground colour. The foremost of the median patches is transversely triangular and placed between the eyes, whereas the two others are longitudinally oval and placed, one on the anterior, the other on the middle part of the back. Of the pairs the first appears as two broad bands from the tip of the snout to the eye, the second is placed behind the eyes, with a rather indistinct branch extending downwards to above the axil, and the third immediately behind the second and sometimes more or less blended together with this one into a crescent shaped marking. This third pair which is placed somewhat in front of the middle of the body is the largest, and forms the cross-bar of the cross; at last a 4th pair of patches occupies the lumbar region, forming an enlarged foot to the cross. Between the median spots and surrounding them as well as between the inner borders of the lateral ones small dark dots are scattered by which a broad dark median band with very different intensity of colours it produced (fig. 7). This band makes the stem of the cross which in the figures mentioned appears to be formed by a single large marking.

In two of the large specimens, as well as in all the small ones, this pattern is very distinct, whereas in the two other large specimens the patches are rather indistinct. If this is due to a different state of preservation, or if it is an individual variation, I cannot decide. According to FLETCHER an »immersion in spirits very soon produces a washed-out effect», and very probably they are only bleached specimens.

In other characteristics the West-Australian specimens seem to agree very well with the East-Australian ones. Judging from the descriptions, the only difference I am able to see, except in colour as already mentioned, is the somewhat more webbed toes of these specimens. According to BOULENGER the toes are webbed at the base, but, as shown in fig. 8, the toes of these specimens may be considered at least as half webbed. Perhaps we have here the same kind of variation in the development of the web as in *Limnodynastes ornatus*, both species being typical burrowers (cfr SPENCER, the Horn Expediton).

Hyla peronii (BIBR.) TSCHUDI. — 3 specimens from Kimberley Division, N. W. Australia: one (a female, 42 mm. with small eggs) in a »billabong» (clay-pit) at Jedda, 25 miles from the coast, and two specimens (a male 44 mm., a female 49 mm. with

large eggs) from Noonkambah, St. George Range, the one crawled in among the leaves of a Pandanus, the other into a bird-nest. Dec. 1910. E. Mjöberg.

About the habitat of TSCHUDI's (BIBRON's) type-specimen there is no more exact statement than »New Holland». According to FLETCHER, however, this species is common in New South Wales, on the plains as well as at the coast; it is recorded from several localities in Queensland and in Victoria, from Port Essington, N. Australia, and according to a statement in Cat. Batr. Sal. also from Tasmania, although ENGLISH has not found it there. In the *Animals of Australia* it is stated to live in Western Australia as well, yet without any nearer account about the locality, and I have not myself seen any other note about that. By this expedition, however, the correctness of this statement has been proved. In Northwestern Australia it lives at the coast, as well as in the interior of the country.

To some extent these specimens differ from the diagnosis in Cat. Batr. Sal., and I have been uncertain if not possibly they should be considered as representing a separate West-Australian race different from the eastern one. Thus, the snout is considerably longer than the orbit, and the interorbital space much broader than the upper eye-lid, in addition to which the groups of vomerine teeth are quite small, rounded, and smaller than the choanæ, rather much different from the figure, given by KEFERSTEIN (Taf. 8, fig. 31). The colour, as well as other characteristics, however, agree well with the descriptions of the typical *H. peronii*, and by DE VIS' diagnosis of his *H. rothi*, considered by BOULENGER as synomynous with that one, I have got an idea about the great variation of this species, and have convinced myself about the correctness of referring my specimens to *Hyla peronii* TSCHUDI, which then is distributed over the whole East and North Australia.

In the male the throat is mottled with brown, which also to some extent is the case in the female with the large ova, whereas the female specimen with small ova has the throat uniform dirty white.

Hyla rubella GRAY. — 9 specimens, 3 adult (2 males, 1 female 38, 36, 30 mm.) and 6 joung ones, 26—20 mm. in length, all from different springs in St. George Range, Kimberley Division, N. W. Australia, about 170 miles from the coast. Jan.—Febr. 1911. E. Mjöberg.

GRAY's specimen was from Port Essington, the North coast of Australia, and according to statement in Cat. Batr. Sal. this species it recorded from Nicol Bay, N. W. Australia, and from several localities in Queensland. FLETCHER has obtained it from the interior of N. S. Wales, but not from the coast, and the Horn Expedition collected »numerous specimens at various localities» in Central Australia. As shown above it appears to be common also in the interior of N. W. Australia, and probably this species is an inland form, although it at several places has straggled to the coast.

The toes are said to be $^2/_3$—$^3/_4$ webbed; as far as I can see, they are in all these specimens only about half webbed, 2—3 joints of the fourth toe being free from

web. The rather distinct folds along the free distal joints, I think, have caused that the web has been recorded too large. Indeed, in some of the small specimens the foot seems to be not even halfwebbed.

Hyla ewingii. DUM. & BIBR. — One specimen from Adelaide, $^{16}/_{10}$ 1911. ♂, 23 mm. E. Mjöberg.

The type specimen of this species was obtained from Tasmania where this species according to ENGLISH (Proc. Zool. Soc. 1910 p. 632) is common; it is also frequently found in the coastal division of N. S. Wales (FLETCHER), as well as in Victoria (FLETCHER, LUCAS), and it seems to live in the whole southern coastal division, being recorded from King George's Sound as well as from Adelaide. GÜNTHER (Ann. Nat. Hist. 1867) has obtained it from North-East Australia, and very probably KREFFT is right in saying that this species lives in »almost every part of Australia the west coast excepted» (quoted from FLETCHER 1892, p. 14). Probably, the interior districts of the continent may also be excepted, although FLETCHER sometimes has found it in New South Wales west of the Dividing Range (FLETCHER 1892, p. 7, 8, 13—16), »probably a straggler from the coast».

Hyla calliscelis, described by PETER's 1874 in *Monatsber. Berl. Ac.* p. 620, is now considered as a mere variety of *H. ewingii*, differing from the typical form by purplish black spots on thighs and in the groin. PETER's type-specimen was from Adelaide, and according to FLETCHER *Hyla ewingii* is represented in New South Wales only by this variety, which also has been recorded from St. George's Sound, whereas the typical form lives in Victoria and Tasmania. The spotted variety has extended from there to the North as well as to the West. Thus, as my specimen is collected at Adelaide, it ought to be referred to var. *calliscelis* as well, and in fact there are to be found in the groin a dark, although rather indistinct patch as well as some rather large purplish-black spots on the hind side of the thighs. These markings are absent in a specimen from Victoria, kept in the R. Museum of Nat. History, and if really these two forms should be maintained as different varieties, the present specimen may be considered as a *calliscelis*. Yet, the differences between the specimen from Adelaide and the typical specimen from Victoria, examined by me, are very unimportant, the lumbar spot especially being rather indistinct. Besides, I may add to this that in the N. S. Wales specimens of var. *calliscelis*, according to FLETCHER, the spots frequently are lacking on the hind surface of the thighs.

Hyla adelaidensis. GRAY — Fig. 9, 10. — 5 specimens, Perth, Freemantle, Aug.—Sept. 1910; 3 males 45—57 mm., 2 females 70—72 mm. E. Mjöberg.

GRAY's type specimens are also collected in the coastal division of West Australia, although there is no account of the exact locality. In GÜNTHER's catalogue 1858 this species is recorded from Port Essington, N. Australia; PETERS states it (1863) from Adelaide and GÜNTHER 1867 from Port Denison (Queensland). If *Hyla*

schuetteii from Sydney, described by KEFERSTEIN 1868, p. 279, is a synonym of *H. adelaidensis*, as BOULENGER says, and which KEFERSTEIN's figure appears to confirm, and if there are no mistakes about the habitat of the same, this species must also live in N. S. Wales, although it has not been collected there by FLETCHER. It is neither recorded from Victoria, nor from Van Diemens Land.

The five specimens show a beautiful colour series from the young light-striped dark specimens to the considerably lighter, almost uniform olive greyish adult ones. One of the smallest specimens has the upper surfaces pretty bluish black with a light dorsal line from between the eyes to the vent (fig. 9), another broader light stripe extends from the tip of the snout to between the nostrils where it divides into two, each running along canthus rostralis above the eye and the tympanum, and along the sides to the groin. Between the dorsal line and these lateral stripes a narrow light line extends on each side from somewhat before the middle of the body to the lumbar region. From the tip of the snout another light band runs below the eye to the axil, tapering behind, and not reaching the margin of the upper jaw which is black. Also the upper surfaces of the legs are bluish black with light irregular crossbars. Lower parts of sides light without distinct limits merging into the under surfaces which are dotted with blackish on the light bottom. From this specimen another of about the same size differs only by a lighter ground colour; in this latter the dark colour has disappeared from the margin of the upper jaw and to a great extent as well from the limbs which are light olive grey, with exception of some dark spots on the tibia. The outermost lateral bands have to great extent blended with the light colour of the side, as well as partly with the inner lateral bands. All light bands are broader than in the first mentioned specimen. In the next specimen (a male, 57 mm.) the differences from the smallest dark specimen are still greater. As is shown by fig. 10, the light colour of this one has become the ground colour, and the dark one has been reduced to four parallel dorsal stripes which, especially the outer ones, show a tendency to split into spots, and to a pair of bands extending from the nose through the eye, above the tympanum to the middle of the side. Between this pattern and that, shown in KEFERSTEIN's figure of *Hyla schuetteii*, Taf. VIII, fig. 27, the differences are not very great; in this latter some irregular markings are left of the regular four bands in the former. If even these spots should disappear, such a colour would be produced as that of the two largest of my specimens wich are uniform plumbous grey only with indistinct dark dots on the back and a broad light dorsal band, indistinctly limited from the somewhat darker ground-colour.

Hyla affinis GRAY. — 6 specimens from the Kimberley Division, N. W. Australia; at the end of the year 1910 and the beginning of 1911. E. Mjöberg; viz.:

1 specimen in a billabong (clay-pit) at Jedda 25 miles from the coast; male, 37 mm.

1 specimen, Noonkambah, St. George Range, about 160 miles from the coast; a female, 37 mm., with large eggs.

4 specimens, in springs on St. George Range, about 170 miles from the coast, three females, 33—35 mm., with large eggs, and a male, 31 mm.

GRAY's type specimen was obtained from Port Essington, N. Australia. Besides, this species is recorded from Queensland, but, as far as I know, not from any other country. It seems, however, to be common in the Kimberley Division where Dr. MJÖBERG found it near the coast as well as in the interior. The specimens agree very well with the diagnosis in the Catalogue of Batrachia Salientia; the ground colour is grey or brownish olive with rather indistinct dark patches on the back, an angular dark spot between the eyes, and a dark band along the canthus rostralis. In all specimens the under side of the thighs is more or less marbled with black and white.

Hyla nasuta GRAY. — 1 specimen, Yandina, S. E. Queensland, in the rain forest not far from Brisbane, $^{15}/_{9}$ 1911, ♂ 38 mm. E. Mjöberg.

GRAY's type specimen was obtained from Port Essington, N. Australia. GÜNTHER (1867) records it from Brisbane, Clarence River, and from Sydney; the last mentioned locality is, however, according to FLETCHER probably a mistake, caused by the confounding of this species with another. In N. S. Wales FLETCHER has found it only in the North, in the border-land to Queensland (1893 p. 525).

Except for the colour of the back, which is not »einfarbig kastanienbraun» but provided with two light dorsolateral bands, diverging behind, and separating a light brown dorsal area from the dark chesnut brown sides, this species agrees very well with BOETTGER's description of *Hyla semoni* from the south-eastern part of New Guinea (Zool. Forschungsreise in Australien Bd. 5, Lief. 1, p. 112) which species probably is identical with *H. nasuta*.

Explanation of the Plate.

Figs. 1 a—l. Variation of the colour pattern in *Crinia signifera* Gir. (The specimens a—b, d—h, and l) collected in the same pool at Perth, c from St. George Range, Kimberley, i from Adelaide, k from New South Wales. The figures do not show the real different sizes of the specimens, but their lengths are stated in mm. at each figure.

Fig. 2. *Chiroleptes inermis* Peters $^1/_1$.
Fig. 3. *Pseudophryne bibronii* Gnthr. from South Queensland $^3/_2$.
Fig. 4. Head of a specimen of *Pseudophryne* from Adelaide $^1/_1$.
Fig. 5. *Pseudophryne mjöbergii* ♀ n. sp. $^1/_1$.
Fig. 6. Hind foot of *Pseudophryne mjöbergii* ♀ $^3/_1$.
Fig. 7. *Notaden benetti* Gnthr. $^1/_1$.
Fig. 8. Hind foot of *Notaden benetti* $^3/_2$.
Figs. 9, 10. *Hyla adelaidensis* Gray $^1/_1$.

Tryckt den 23 oktober 1913.

Uppsala 1913. Almqvist & Wiksells Boktryckeri-A.-B.

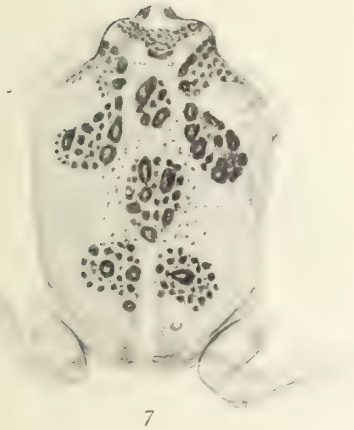
1 a (18) 1 b (16) 1 d (13) 1 e (15) 1 f (19)

1 i (19) 1 h (15) 1 l (12)

2

4

3



7

5

6

8

9

10

A. Ekblom del.

Cederquists Graf. A.-B., Sthlm.